Guidelines for Troubleshooting Insulin Pumps in the School

Any child with diabetes is at risk for both hypoglycemia (low blood sugar level) and for hyperglycemia (extreme high blood sugar levels) with or without ketones. This is no different for a child who wears an insulin pump. It is important for school personnel to know how to treat these two problems if they should occur. The pump does not need to be disconnected.

Hypoglycemia (Low Blood Sugar)

- Symptoms may occur rapidly with or without noticeable signs and symptoms.
- Symptoms may vary from child to child and from one episode to another.
- There may be time when hypoglycemia occurs without an apparent cause.
- If symptoms are left untreated, they may progress to the inability to eat or drink, unconsciousness, tremors or seizure.

Possible causes of **Hypoglycemia**:

- Increased activity
- Delayed or skipped meal
- Inadequate meal
- Too much insulin

Common Signs and Symptoms of **Hypoglycemia**:

- Pale
- Shaky
- Sweaty
- Cranky/Irritable
- Sleepy
- Hungry
- Confusion
- Headache
- Dizziness

Potential Causes of Hypoglycemia With Insulin Pump

Possible Cause	Action
Insulin Pump ■ Basal rate programmed incorrectly ■ Clock time incorrect on display	■ Check times and basal rates ■ Reset clock
Food Intake ■ Bolus too large ■ Improper timing of insulin bolus	■ Check bolus amounts and times ■ Match timing of insulin with bolus Check blood glucose before meal

(list continued on next page)

Potential Causes of Hypoglycemia With Insulin Pump
(continued)

Possible Cause	Action
Activity ■ Did not activate suspend or a temp basal rate ■ Food intake not adequate to accomodate exercise. ■ Unplanned activity	■ Consult with health care professional for guidelines to temporarily decrease rate for exercise ■ If not decreasing insulin for exercise, must eat carb containing food prior to exercise ■ Must check blood glucose prior to activity ■ Effects of exercise may be present for several hours after the exercise
Self-Monitoring of Blood Glucose ■ Infrequent blood glucose testing ■ Hypoglycemia unawareness	■ Check blood glucose a minimum of four times per day ■ May need to raise blood glucose goals

TREAT HYPOGLYCEMIA IMMEDIATELY!!

Use "Rule of 15"

Consume 15 grams of fast-acting carbohydrate
Wait 15 minutes
Recheck blood glucose
If blood glucose is <90 mg/dl, repeat above steps.*

THERE IS NO NEED TO DISCONNECT PUMP!!

If a child cannot take food by mouth, give GLUCAGON by injection. Turn the child on his/her side to prevent aspiration in the event of vomiting.

Treat the condition first, and then call the **medical team** and the parents. The school's plan of care should indicate how hypoglycemic epidsodes are to be reported to a parent.

Since eating disorders can be a problem, the student should be referred back to the registered dietitian and primary provider if a pattern becomes apparent. At point of service, the student should be counseled about adequate intake and carrying a sugar source.

*While 90 mg/dl is certainly not considered low blood sugar, due to the volatility of blood glucose levels in type 1 children related to changes in activity and variations in insulin absorption, 90 can drop to <60 very quickly.

Hyperglycemia (High Blood Sugar)

- High blood sugar occurs due to an imbalance of food, exercise and insulin. Although not desirable, there is no immediate problem caused by mild hyperglycemia.
- This could happen in any child or teen with diabetes.

Possible causes of **Hyperglycemia**:

- Illness
- Too much food
- Not enough insulin
- Decreased activity
- Increase in hormones
- Rebound from low blood glucose level

Common Signs and Symptoms of **Hyperglycemia**:

- Increased thirst
- Frequent urination
- Fatique
- Blurred Vision

Potential Causes of Hyperglycemia With Insulin Pump

Possible Cause	Action
Infusion Site/Set*	
■ Redness, irritation at site	■ Change infusion site/set
■ Bump or nodule at infusion site	■ Rotate site, avoid these areas
■ Needle inserted in area of friction	■ Avoid waistline and friction areas
■ Air in tubing	■ Prime air out of tubing
■ Luer lock connection between cartridge/ reservoir not tight	■ Check connection
■ Insulin leakage at site	■ Change site
■ Not changing cannula every 2-3 days	■ Remember to bolus to fill cannula after site change
Insulin Pump	
■ Basal rate programmed incorrectly	■ Check times and rates
■ Pump is in SUSPEND	■ Take pump out of SUSPEND
■ Pump malfunction	■ Call pump manufacturer customer service
■ Pump alarms	■ Identify alarms, take action as outlined in User Manual
■ Time/date programmed incorrectly	■ Change cartridge/reservoir and infusion set
■ Occlusion alarm	■ Change batteries
■ Dead battery	■ Fill new cartridge/reservoir
■ Cartridge/reservoir empty	

*** Site should be changed every 2-3 days or as recommended by health care professional. Notify health care professional with signs or symptoms of infection.**

(list continued on next page)

Potential Causes of Hyperglycemia With Insulin Pump
(continued)

Possible Cause	Action
Food Intake ■ Bolus insufficient or omitted ■ Improper timing of insulin bolus	■ Need to count carbohydrates ■ Consult healthcare professional
Activity** ■ Blood glucose >240 with ketones before exercise	■ Blood glucose will increase with exercise when ketones are present

****Do not exercise with ketones. Consult healthcare professional for exercise guidelines.**

The treatment of high blood sugar in a student with an insulin pump is to give a correction bolus, temporarily increase the basal rate, or possibly, exercise. If there is a pattern of high blood glucose at certain times of the day, the parent or clinician should be notified. If a pattern emerges, refer the student back to the registered dietitian to review carb sources and portion sizes.

SMART PUMPERS TIP
When in doubt, change it out!!

For unexplained high blood glucose (>240 mg/dl two times in a row), change the cartridge/reservoir and infusion site and set; check the urine for ketones; and take fast acting insulin by syringe as directed by the health care professional.

Diabetic Ketoacidosis (DKA)

Ketones are produced when there is insufficient insulin. The body begins to break down body fat that produces ketones. As ketones increase in the blood and urine, the body becomes acidic, thus leading to a condition called Diabetic Ketoacidosis (DKA),

Symptoms of DKA may include:

- ✓ Moderate or large amounts of ketones in the blood and urine
- ✓ Nausea, vomiting, stomach pain
- ✓ Labored breathing
- ✓ Fruity breath
- ✓ Weakness
- ✓ Mental sluggishness, slowness to respond
- ✓ Loss of consciousness, coma

Source: The information in this section was obtained from Tricia Green, RN, CPNP, CDE with Animas Corporation and from *Pumper in the School*, a publication by MiniMed.

Insulin Pump Manufacturer Contacts:

Animas Corporation **1-877-YES-PUMP**
Disetronic Medical Systems, Inc. **1-800-280-7801**
Nipro Diabetes Systems, Inc. **1-888-647-7698**
Deltec, Inc. **1-800-826-9703**
Medtronic MiniMed **1-800-MINIMED**
Dana Diabecare USA **1-866-DANATEC**